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Since L is any point of QR , QR is the locus of centers of circles which will bisect the circumferences of the circles A and B .

The required construction is now obvious. Draw the locus of centers of circles which bisect the circumferences of the given circles, taken two and two. Their common intersection will be the center of the required circle.

Solutions to this problem were also received from *Professors* H. W. DRAUGHON, WILLIAM HOOVER, WILLIAM SYMONDS, P. H. PHILBRICK and ———

18. Proposed by Professor HENRY HEATON, Atlantic, Iowa.

Through two given points to draw two circles tangent to a given circle.

Solution by Professor T. A. TIMMONS, St. Mary's Kentucky; D. A. ROTHRIK. A. M., Professor of Mathematics, Indiana University, Bloomington, Indiana; J. H. BEACH, Tiffin, Ohio; P. S. BERG, Apple Creek, Ohio; JOHN DOLLMAN, Jr., Counsellor at Law, Philadelphia, Pennsylvania; and P. H. PHILBRICK, C. E., Lake Charles, Louisiana

Let A and B be the given points and O the center of the given circle. Through the points A and B draw *any* circle cutting the given circle in the points C and D . Draw the lines AB and DC and produce them until they meet in P . Draw the tangents PT and PT' . At E , the middle point of AB , erect the perpendicular EF . Now EF is the locus of the center of all circles passing through A and B . Draw the radius OT and produce it till it meets EF in O' . Then O' is the center of a circle passing through A and B and tangent to the given circle at T .

In like manner, by drawing the radius OT' and producing it to meet EF , we find O'' , the center of another circle fulfilling the conditions of the problem.

Discussion.—If one of the given points is within the given circle, the point P falls within the given circle and there is no solution. If the given points lie on the circumference of the given circle there is one solution. In all other cases there are two solutions. When EF passes through the center of the given circle the general construction fails.

This problem was solved in a similar manner by G. B. M. ZERR, WILLIAM SYMONDS, and The PROPOSER. H. C. WHITAKER solved it by Cartesian Geometry. CHRISTIAN HOMING, Professor of Mathematics, in Herdleberg College, did not solve the problem but referred to Casey's Sequel to Euclid's Elements, Prop. X., Sect. V., Bk. VI.

